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## **MARKETS FOR PUBLIC GOODS?**

September, 1993

**Hal R. Varian**  
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This is a critical review of a book of essays entitled "Public Goods and Market Failures", edited by Tyler Cowen. The essays in the book argue that the private market is capable of handling many sorts of public goods and externalities problems, and that conventional theory that calls for public intervention is misleading. I agree with the first statement - many sorts of public goods and externalities can be handled by private markets - but I disagree that the conventional theory is misleading on this point.

I devote considerable space to a critique of Ronald Coase's famous essay on "The Lighthouse in Economics". Coase claimed to show that lighthouses in 17th century England were provided adequately without state intervention. I argue that in fact, the state intervened extensively in the provision of lighthouses in Britain in that they set up the institutional and legal structure that allowed and encouraged lighthouses to be provided. I also argue that conventional theory of public goods a la Samuelson yields significant insight into why certain institutions were structured the way they were.

# Markets for Public Goods?

by

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**Abstract.** There is a presumption in some circles that the identification of an externality or a public good presents a *prima facie* case for government intervention. Tyler Cowen has assembled a group of articles that critique this view by arguing that the market, broadly construed, can handle many problems of public goods and externalities that are normally considered the province of the state. Although these articles present a stimulating perspective on problems of externalities and public goods, I find that several of the essays overstate their case and misrepresent the standard theory of public goods and externalities.

**Keywords.** Public goods, externalities, markets

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## Markets for Public Goods?

Hal R. Varian

Standard economic theory argues that under certain conditions free markets may be expected to provide a Pareto efficient allocation of resources. Among these conditions is the absence of externalities. By this economists mean that once an economic agent (a firm or a consumer) knows the prices at which it can buy and sell, it does not care about other decisions the other economic agents might make.

In reality there are many sorts of externalities. I may care about how loudly my neighbor plays his stereo or the color that he paints his house. I may care about how he may vote since that will determine in part the level of production of various publicly provided goods like schools, roads and streetlights.

Since there are many externalities of this sort in real life it follows that we cannot expect that market outcomes will be perfectly efficient. But this is a very weak statement: most of the other assumptions necessary to ensure efficiency are also violated to one degree or another. The question is not whether the market mechanism is *perfectly* efficient, but rather whether it is reasonably efficient when compared with alternative mechanisms.

It is not enough to say that a resource allocation mechanism is flawed without providing something else to put in its place. When someone says that there is a "market failure" an appropriate reply is "relative to what?" It may well be that the market mechanism will be inefficient in the presence of externalities, but other forms of resource allocation—such as political intervention—may be even more inefficient. To paraphrase George Stigler, saying that market failure is a justification for governmental intervention is like awarding the grand prize to the first entrant in a contest before even looking at the other entrants.

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## 1. Public goods: basic concepts

Public goods are a well-known kind of externality. According to the textbook definition a “pure” public good is *nonrival*, meaning that one person’s consumption of it does not reduce another person’s, and *nonexcludable*, meaning that individuals cannot be prevented from consuming the good. Generally there is some particular amount of a public good supplied, and everybody must make do with the available amount. The classic example of a pure public good is national defense. Other commonly used examples are TV and radio broadcasts, street lights, roads, lighthouses, etc.

Ordinary goods are both excludable and rival: I have the right to prevent you from consuming my candy bar and if I take a bite from it, then there is less candy available for you to consume. Some goods (e.g., a private swimming pool) are excludable but partly rival. The pool is excludable since unauthorized users can be prevented from using it. It is partly rival since the presence of other users may affect my enjoyment of the pool. If a good is partly rival in this way it is sometimes called “congestible.”

Many “pure” public goods turn out to be “impure” upon closer inspection. My use of street lights *can* be affected by your use—if I happen to stand in your shadow. Similarly, my use of the roads may well be affected by how many other people are using them. The issue is one of degree. Roads are congestible so they aren’t a *pure* public good—but there’s still a big difference between a road and a candy bar!

## 2. Public goods: basic theory

Conventional economic theory claims that the amount of a public good will be undersupplied in a free market. More precisely, if each agent makes an *independent* decision about how much he will contribute to a public good, the resulting allocation will be Pareto inefficient. That is, there will be some other allocation of resources that will make *all* agents better off.<sup>1</sup>

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<sup>1</sup> For a simple description of public goods see Varian (1993). For a more detailed textbook discussion, see Cornes and Sandler (1986). For a more advanced survey of recent issues, see Blumel, Pethig, and von dem Hagen (1986). For a detailed theoretical examination of a model of voluntary contributions to a public good see Bergstrom, Blume, and Varian (1986).

Conventional theory does *not* claim that public goods will not be privately supplied at *all*, just that an efficient amount will not be supplied by purely voluntary actions. My neighbor grows flowers for his own satisfaction: the fact that I enjoy seeing his flowers makes them a public good. This doesn't prevent him from growing his flowers; however, it is certainly possible that if I contributed to his horticultural efforts he may well decide to grow more flowers and we would both be better off.

#### *An example of the problem of public goods*

Let us consider a more detailed example to fix some of these ideas. Suppose that Andy and Bob contemplate putting up a street light in front of their houses. One street light costing \$600 will be adequate to provide lighting for both houses. Each person values the services of the light at \$400. If each person makes an *independent* decision about whether to provide the light, the light will not be provided, since the benefit to each person (\$400) is less than the cost of the light (\$600).

However, if Andy and Bob get together they could each agree to contribute \$300 to the street light. Each of them would then be better off since they would have a net value of  $\$100 = 400 - 300$ . This shows that providing the street light and splitting the cost in this manner is a Pareto improvement over the case where each party makes an independent decision.

Another efficient allocation would be for Andy to pay \$350 and Bob to pay \$250. This would still be adequate to cover the cost of the street light and leave Andy and Bob with positive surplus. In general any division of payments that leaves each consumer with positive surplus and sums up to \$600 will be a Pareto improvement over the no-provision outcome.

#### *Free riding*

Suppose now that Andy values the street light at \$700 and Bob values it at \$200. Now if they each act independently Andy will purchase the light for \$600 and Bob will *free ride* on the services of the streetlights. The allocation resulting from this kind of independent decision is still Pareto efficient, but the gains from trade are divided unequally.

What if negotiation is allowed? We can imagine all sorts of things that might happen: Andy may well argue that Bob should pay "his fair share" of the street light. But Bob would rationally hold out since he knows that Andy will be willing to provide the street light on his own. We can observe that it is Pareto efficient to provide the street light, but we can't say anything much about how the costs will be covered without knowing more about the strategic choices open to Andy and Bob. We have to specify the game in more detail before we can make any particular statements about what will happen.

### 3. Problems with the provision of public goods

When examined in such a simple model it seems that problems with public goods can't really be too serious. After all, people can just get together and solve them, right? This is probably true for the kinds of simple two-person, yes-no problem just considered.<sup>2</sup> But what happens when the problem gets more complicated?

Suppose that the placement of the streetlights is variable. Bob wants it closer to his house, and Andy wants it closer to his. Bob argues that he has a bigger house, so he needs better illumination. Andy finds this argument unconvincing. Now the simple yes-no problem becomes more complex: where should the light be located and how much should each party pay? Andy and Bob may well devote considerable time and effort to negotiating the outcome.

A particularly problematic case is when Andy and Bob don't really know each others' value for the public goods. Each may hold optimistic beliefs that the other will provide the streetlight if they just wait long enough. In this case it seems that there is a clear inefficiency: if they could just get together and lay their cards on the table they could readily accomplish their (joint) objective. But opportunistic behavior leaves them both worse off.

What if we consider streetlights for a whole neighborhood or a whole city? The problem quickly becomes very complex. Even though everyone may agree that it is better to have streetlights than not have them, the costs of negotiating where the streetlights will be placed and how they will be paid for may be quite difficult.

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<sup>2</sup> But perhaps the divorce rate statistics show that even two-person externality problems aren't so simple.

Contrast this to the problem of how much ice cream should be produced and consumed. Here the market provides a simple, decentralized solution: each consumer looks at the price of ice cream and the amount of money he has and decides how much ice cream he wants to purchase. He doesn't have to worry about how much anybody else wants to consume.

Even in the case of a pure private good, such as ice cream, it is important to recognize that other people's consumption *really is* relevant to me. If everybody else eats all the ice cream, none will be left for me. But this information about the scarcity of ice cream is all summarized in the market price—and in a perfect competitive market the price adjusts to that the supply of ice cream equals the demand, so that all consumer's needs are satisfied.

Allocating ice cream is, in principle, just as difficult as allocating street lights. But since individuals only care about their own consumption of ice cream, and not other peoples' consumption, the overall allocation problem can be separated into lots of little allocation problems that can be solved by each individual consumer. All the information necessary for resource allocation is summarized in one number—a price. This sort of decentralized solution cannot be done for the public goods problem.

#### **4. Mechanisms and institutions to provide public goods**

Or can it? Perhaps we are giving up too soon. Is it possible to find some way to decentralize the allocation of public goods in the same way the market decentralizes the allocation of private goods?

Indeed, we often use a variety of "decentralized" ways to determine the amount of a public good. Simple negotiation is often effective. There are legal remedies available when one party imposes costs on another. Voting and other forms of government can be used to determine how much of a public good is provided and how it should be paid for.

But these mechanism have costs. Negotiation is a costly activity, especially when parties have little information about the payoffs to other parties. The legal system involves heavy transactions costs. Voting will only produce efficient outcomes in certain situations.



There is a branch of economic theory called *mechanism design* that attempts to design various ways to economic allocation problems. Similarly, the *new institutional economics* tries to explain how real-world institutions serve to solve various kinds of resource allocation problems that lie outside the scope of the traditional economic institutions such as markets.

Mechanism design theorists have come up with a number of clever ways to “solve” externality and public goods problems. But this literature is primarily theoretical in nature, and there are few examples of actual applications. Most of the applications that have been tried in the laboratory, or in small-scale experiments, have been fairly straightforward variations on markets. See Ledyard (1992) for a survey.

## 5. Public provision of public goods

Most of the commonly-used examples of public goods are goods that are provided by governments. But there are many other examples of non-governmentally provided public goods. A mother and a father each cares about their child’s welfare so the child’s welfare is a public good for them. Similarly, the cleanliness of the kitchen is a public good for the inhabitants of the household. As Bergstrom (1993) points out, family life is filled with externalities and public goods.

Even goods that are normally supplied by government may also be supplied privately. TV broadcasts are supplied by government in some countries and privately in others. Roads, bridges, fire protection, etc. are commonly provided by government but have often been provided privately.

On the flip side, goods that are inherently private goods are often supplied by governments. Education is a notable example. Education is excludable and diminishable: private schools are perfectly feasible and widely available. However, most governments have taken it upon themselves to provide public education.

## 6. Private provision of public goods

The essays in Tyler Cowen’s new volume, *Public Goods and Market Failures* are concerned with many of these issues. The central theme of these essays is that “private” provision

of public goods may not be as bad (or as inefficient) as economists have thought. If there are "market failures" various institutions will arise to solve these problems. And even if such institutions haven't arisen in some particular case, it doesn't mean that one can't think of ways that they might arise.

*Samuelson and Bator: straw economists*

The first two classic articles in the collection lay out the problem of market failure: Samuelson's "The Pure Theory of Public Expenditure" and Bator's "The Anatomy of Market Failure." These articles are presumably included since they lay out the premise that the rest of the articles attack: if there is a market failure, then the state should provide the remedy.

It is worth observing that neither Samuelson or Bator actually say this. Samuelson simply points out the problem that the classic market mechanism won't work, and that some other sorts of mechanism must be used. He mentions "voting" and "signalling" as possibilities but doesn't attempt to explore alternatives to the private market. Bator is even more explicit. He says "As long as activities have even a trace of publicness, price calculations are inefficient." But he quickly adds in a footnote: "This is not to say that there exist other feasible modes of social calculation and organization that are more efficient." (p 64)

In other writing Samuelson is careful to indicate that the mere identification of a public good is not necessarily a call for government intervention:

"The pure theory of public expenditure . . . often uses the term "public good" but cannot properly be interpreted to imply that that private goods should be produced by private enterprise and public goods should be produced by government directly . . . Where the consumption externalities intrinsic to a non-private good occur, all that I would insist on is that *laissez faire* can not be counted on to lead to an optimum. There is a *prima facie* case, so to speak, for social concern and scrutiny of the outcome; but that does not necessarily imply outright state ownership in every case public regulation. The exact form in which the social concern ought to manifest itself depends on a host of considerations that have to be added to the model." Samuelson (1972)

It is hard to find a respectable economist who has maintained that "market failure" requires "government management." So it must be acknowledged that to some extent the

essays in Cowen's book are attacking a straw man. Despite this qualification, it is safe to say that there is a liberal orthodoxy that leans in the direction of government intervention as the "solution" to externalities problems and one can think of the essays in this volume as providing a counterweight to this orthodoxy.

To this extent they are successful: the essays remind us that there are a number of non-governmental institutions that can be used to provide public goods, even public goods that are conventionally supplied by the government. But this point is obvious to anyone who has thought seriously about public goods. The problem is not with the theory of public goods theory itself, but rather with casual and imprecise statements of the theory. In this essay I will argue that the conventional *theory* of public goods stands up pretty well to the attacks levied on it in this volume.

#### 7. Coase: shedding some light on lighthouses

Coase's famous essay on "The Lighthouse in Economics" can serve as a case in point. Coase begins his essay by examining some claims made by Mill, Sedgwick, Pigou, and Samuelson on the lighthouse. Each of these authors points to the difficulty of charging ships for their use of the lighthouse services; this is the problem of nonexcludability that is *one* of the defining features of a public good. According to Coase only Samuelson refers to the nonrival aspect of the lighthouse as a public good---once the lighthouse is built, the marginal cost of serving additional ships is zero.

Coase paraphrases Samuelson's observation by saying:

"There is an element of paradox in Samuelson's position. The government has to provide lighthouses because private firms could not charge for their service. But if it were possible for private firms to make such a charge they should not be allowed to do so (which also presumably calls for government action)."

This is a cheap shot: there's no paradox in Samuelson's position and Coase is presuming too much. Samuelson's point is that problems of nonexcludability may lead to an inefficient underprovision of lighthouse. But even if the excludability problem were solved, charging a positive price would lead to another sort of inefficiency since the price of the service would exceed its *marginal* cost of provision. Samuelson's point is that

*efficient* provision of lighthouse services requires a zero *marginal* price. We will return to this point below.

The main purpose of Coase's essay is to examine the history of the British lighthouse system: "... a study of the history of the British lighthouse system is [useful] because it serves to enlarge our vision of the range of alternative institutional arrangements available for operating a lighthouse." We will briefly review this history here.

The "official" provider of lighthouses in the 17th century in Britain was Trinity House, a charitable organization that evolved from a medieval seamen's guild. Trinity House apparently did not satisfy the demand for lighthouses and private profit-seeking individuals actually provided the majority of the lighthouses built in the 17th century.

"The method used by private individuals to avoid infringing Trinity House's statutory authority was to obtain a patent from the Crown which empowered them to build a lighthouse and to levy tolls on ships presumed to have benefited from it. The way this was done was to present a petition from shipowners and shippers in which they said that they would greatly benefit from the lighthouse and were willing to pay the toll. The tolls were collected at the ports by agents ... who might be private individuals but were commonly customs officials. The toll varied with the lighthouse and ships paid a toll, varying with the size of the vessel for each lighthouse passed ... books were published setting out the lighthouses passed on different voyages and the charges that would be made."

Faced with this competition from the private sector, Trinity House began to apply for patents to operate lighthouses and then would sell this right to individuals who would build and operate the lighthouse. Many lighthouses were built in this manner, but eventually dissatisfaction arose. A report from the House of Commons argued that it would be better to consolidate all lighthouses under a single operating authority, Trinity House. The report indicates several reasons for this conclusion:

- differences in operating and billing procedures;
- inadequate and slow provision of lighthouses "often after disastrous losses at sea."
- "heavily taxing the Trade of the country, for the benefit of a few private individuals."

Coase asserts that the third point was the most important, although he presents no evidence for this claim.

The consolidation of lighthouses worked in the following manner: Trinity House purchased the lighthouses from the private individuals using mortgages backed by the lighthouse dues. Once the loans were paid off, the Government requested that Trinity House reduced the lighthouse tolls. Trinity House objected venomously to this proposal, but they were overruled by the Court. In 1898 the system was again reformed: the dues were simplified and paid into a General Lighthouse Fund "which was to be used solely for the maintenance of the lighthouse service."

What does Coase conclude from this history? He seems to think that he has shown that the conventional theory of public goods does not provide an adequate description of lighthouse provision in Britain. He makes several points.

- "Contrary to the belief of many economists, a lighthouse service can be provided by private enterprise." But what economist has claimed that public goods cannot be privately provided? None, as far as I know. The only claim is that public goods will be provided at a less than efficient level. Indeed the House of Commons report quoted by Coase seems to concur with this point.
- Coase also argues that charging ships for lighthouse dues is not inefficient since the toll structure is highly nonlinear: after the first 10 voyages the marginal toll was zero. As he says "It is difficult for me to resist the conclusion that the benefit which would come from the abandonment of the light dues would be very unimportant and that there would be some loss from the change in the administrative structure." But this is completely consistent with standard theory: the standard theory says efficiency implies that since the marginal cost of providing an additional ship with lighthouse services is zero the *marginal price* paid by each ship should be zero. This is exactly the point made by Samuelson that Coase took issue with.
- Coase claims that he has shown that "The charges were collected at the ports by the agents for the lighthouses. The problem of enforcement was no different for them than for other suppliers of goods and services to the shipowner. The property rights were unusual only in that they stipulated the price that could be charged." But this seems to me to be entirely wrong. When I buy a loaf of bread I am charged for that loaf of bread. When someone used the services of a lighthouse in Britain he was charged

only if he *also use a port in Britain*. If everyone who used lighthouse services in Britain also used a port in Britain, and people can be excluded from port usage, then the fact that they cannot be excluded from lighthouse usage is of little consequence: fees for lighthouse usage can be built into the port fees, as indeed they were.

- Finally, Coase claims that making the immediate beneficiaries of the service (the shippers) pay tolls for the service makes the provision of lighthouses more efficient: "... it would seem a safe conclusion that the move to support lighthouse service out of general taxation would result in a less appropriate administrative structure." This, it seems to me, is a fair point. Samuelson's theory would argue that it is efficient to have the lighthouse's provided by lump-sum taxation—an extreme form of the nonlinear pricing that was actually used. But Samuelson is mute on the point of *who* should be taxed—his theory does not have a model of bureaucratic behavior, and thus cannot compare the relative efficiency of various administrative structures.

Coase concludes his essay by saying "How is it that these great men have ... been led to make statements whose meaning, if thought about in a concrete fashion, is quite unclear, and which, to the extent that they imply a policy conclusion, are very likely wrong?" Coase implies that this is due to the fact that none of these authors have conducted a detailed study of lighthouses, as Coase did. But I think that Coase's critique of "these great men" is simply wrong: the conventional theory of public goods, as espoused by Samuelson and others *does* provide essential insights into the functioning of the British lighthouse industry—insights that Coase did not apparently recognize.

#### *State intervention in lighthouse provision*

When one examines Coase's essay in more detail, one sees that there are several places where state intervention was practiced.

- The state granted exclusive rights to Trinity House to construct lighthouses.
- When Trinity House failed to provide lighthouses in adequate numbers the state granted the right to construct lighthouses and collect fees for them at British ports.
- The state cooperated in collecting these fees.

- Due to flaws in the private provision of lighthouses, the state granted Trinity House authority to acquire the existing lighthouses and operate them under uniform procedures.

From the viewpoint of economic theory there were several interesting features of Coase's story. First, there is the question of how the demand for lighthouses was determined. Recall that a private individual collected a petition with signatures of shipowners agreeing to pay a fee for a lighthouse.

It is known that efficient provision of a public good is an equilibrium for this mechanism. We can see this easily using the streetlight example described above. Recall that Andy and Bob are each willing to pay \$400 for a streetlight, but that it costs \$600 to provide one. Suppose that a streetlight contractor offers them each the following deal: they each write down a price, and if the sum of the prices exceeds \$600, the contractor will build the streetlight.

It is easy to see that each of them writing down \$300 is an equilibrium since if I think that the other person will write down \$300, then my best response is to write down \$300. Hence it is a (Nash) equilibrium for the efficient amount of the public good to be provided.

However, this is not the only equilibrium. Andy writing down \$350 and Bob writing down \$250 is also an equilibrium. More troubling is the fact that each writing down \$0 is an equilibrium: if the other person writes down \$0 then I may as well write down \$0. So there are *inefficient* equilibria to this mechanism as well.

Still it seems that this works pretty well in practice; the problem is that the notion of Nash equilibrium is too weak, not that the mechanism is really inadequate. Bagnoli and Lipman (1989) have explored this idea in more detail.

A second point of interest is the method of collecting the payment: through port fees. The rationale for this is that the services of the public good can only be consumed in conjunction with the (easily-monitored) consumption of an excludable good—the port. In economists jargon, the port services are a complementary good. This is just like making TV broadcasts excludable by coding the broadcast and charging a rental fee for the decoder.

Note that state intervention is required to support this mechanism: the state must restrict competition. If the Port of Brunswick is required to collect fees to cover lighthouse services, what happens if the Port of New Brunswick opens up down the road that does not charge lighthouse fees? Or to use a more modern example, what happens if your friendly neighborhood electronics store starts selling decoder boxes?

Selling an excludable complementary good only works if the state grants a monopoly on the provision of the complementary good. In a perfectly competitive environment providers wouldn't be able to sell the complementary good for more than its cost of production. But granting a state monopoly has efficiency costs as well: it is by no means apparent that this solution to the public goods problem will always be an optimal one.

## 8. Other essays

*Goldin: there's no such thing as a pure public good*

Kenneth Goldin argues that there's no such thing as a public good:

The evidence suggests that we are *not* graced with a set of goods and services which have inherent characteristics of public goods. Rather we are faced with an unavoidable choice regarding every good and service: shall everyone have *equal access* to that service (in which case that service will be similar to a public good) or shall the service be available *selectively* to some, but not to other?

Goldin supports his claim by examining several traditional examples of public goods. He argues that government services such as defense, police, roads, lighthouses are in fact rival at least to some degree since one person's enjoyment of them depends on how many others are consuming them. To me these arguments are splitting hairs: pure public goods are admittedly an extreme case, but then again so are pure private goods. To say that all goods are partly rival may be true, but it doesn't really say very much.

*Brubaker: there's no such thing as free riding*

Earl Brubaker advances the claim that "free riding" is a myth: this kind of strategic behavior "... has little empirical scientific basis, and that, in fact, recently available experimental evidence seems much more nearly consistent with some plausible alternatives."



Brubaker's article was first published in 1975, and at that time this statement was a reasonable one. However, there has been almost 20 years of experimental economics investigation of the free rider problem since then.<sup>3</sup> The picture painted by recent evidence is rather complex, but I think that the following summary is fair: small groups of college students do not free ride as much as the pure theory would predict; however, there is still significant free riding in such groups.

*Demsetz: exclusion solves the public good problem*

Harold Demsetz claims that "given the ability to exclude nonpurchasers, private producers can produce public goods efficiently." Demsetz says that "There is nothing in the public good concept that disallows the ability to exclude." This is certainly not true for today's conception of a public good, and, I would venture that non-exclusion was considered to be an inherent part of a public good even in Demsetz's day. But let us give him this point and contemplate resource allocation with an excludable public good.

Demsetz considers two market forms. In one, TV tapes are sold to customers who view them in their own homes; in the other, the same TV shows are broadcast to everyone. Demsetz argues that as long as you can exclude customers from viewing the broadcast TV show the two markets are essentially equivalent. I agree with this claim. However, it certainly does not follow that *either* market is efficient. In fact, I would argue that an unregulated tape market would exhibit the same inefficiency that an unregulated TV broadcast market would exhibit.

Suppose that once a TV program is produced, the cost of copying a tape is negligible. This implies that additional viewers of the tape can be accommodated at negligible marginal cost, just as additional viewers of the broadcast can be accommodated at negligible marginal cost. But if competition forces the price of a tape down to marginal cost, how can the producer generate the revenue to cover the costs of producing the TV show in the first place? This is the same question that arises with public goods: if the public good is priced at the marginal cost of production of an additional viewer, revenues won't cover the total costs.

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<sup>3</sup> See Ledyard (1992) for a recent survey.

One solution to this problem is for the state to create property rights in intellectual property and punish those who make illegal copies. This creation of monopoly rights makes the market in video tapes viable, but there is no reason to think that it is efficient. Just as in the British lighthouse industry, allowing exclusion in public goods makes market viable but not necessarily efficient.

*Tiebout: local public goods*

Charles Tiebout's famous paper on local public goods examines public goods that have a limited set of users. Public parks are a public good of sorts, but their services are provided only to a restricted clientele: those who live close enough to them to take advantage of these services. This group of people overlaps to a great extent with the people who pay for the public parks: namely, the taxpayers in a given community. There are many other public goods of this sort: streets, streetcleaning, streetlights, etc.

Tiebout's insight was to recognize that cities and towns compete with each other in providing public goods. By supplying more and better local public goods, towns attract taxpayers. Although all taxpayers in a given location have to consume a particular level of public parks, tax payers can choose the level of public parks they want by choosing where they want to live.

If there are enough communities that supply different amounts of parks, each person can choose the community that is right for them. The public goods problem has disappeared since each individual is purchasing the package of public goods that is optimal for him by choosing where he wants to live. One can quibble with Tiebout's point on technical grounds (Bewley (1981)) but there is certainly merit in the basic idea.

The idea of equal educational opportunities is widely accepted these days—so widely accepted that people tend to forget the other side of the issue. Allowing for differences in educational expenditure—or other aspects of local education—allows people to choose different amounts and kinds of education for their children by choosing where they live. If the state succeeds in equalizing educational expenditure across all districts taxpayers will be much more reluctant to spend on education at all, since free riding is a more attractive option. Breaking the link between taxation and provision of public services is a dangerous game to play.

Similarly, courts have recently found that the city of Dearborn, Michigan was in violation of civil rights laws by excluding non-residents from using their parks. But if courts dilute the property rights of municipalities who supply local public goods, the taxpayers in those municipalities will no longer be willing to supply such goods. Is this really in the social interest?

*Buchanan: speak softly but carry a big club*

Recall that a pure public good is both nonexcludable and nonrival. A club good is excludable and partially rival (congestible). As Buchanan points out, such goods can be provided by the private sector. A club good lies between the extremes of Samuelson's pure public goods and the standard conception of pure private goods. See Cornes and Sandler (1986) for further developments in this area.

*Axelrod: repetition helps solve externality problems*

Robert Axelrod describes how cooperation can evolve in games with repeated play. Although Axelrod examines the Prisoner's Dilemma game rather than provision of a public good, the issues are virtually the same. Cooperation is viable in a game with repeated play since agents can retaliate or reward other players for their past behavior.

This idea has been extensively examined by game theorists in recent years, and the idea has been formalized in various ways. The main conclusion is that cooperation is indeed an equilibrium in an indefinitely repeated game. However, the catch is that nearly anything else is an equilibrium, too!

Again, this is more of a problem with the current state of game theory than with the phenomenon per se. The current conceptions of what constitutes a reasonable prediction for a repeated game are too weak to make interesting predictions.

## 9. Case studies

### *Cheung: getting stung by externalities*

The economist J. E. Meade used the example of an apple grower located next to a bee keeper as a parable for his discussion of externalities. Meade argued that if the apple grower and bee keeper made unilateral decisions about the operation of their facilities the resulting allocation of resources would be inefficient. "We call this a case of an unpaid factor, because the situation is due simply and solely to the fact that the apple-farmer cannot charge the beekeeper for the bees' food. (Meade (1952))"

Steven Cheung's article investigates the actual contractual arrangements governing the interactions of beekeepers and apple growers in Washington State circa 1972.<sup>4</sup> He found that there was a well-developed market for bee pollination services. Beekeepers would bring hives to orchards during blossom season and collect a fee from the apple growers for the pollination services provided by the bees. Cheung identifies a few problem externalities with these arrangements: bees may also fertilize neighbors' orchards, and a farmer who uses pesticides while a neighbor is trying to pollinate his crop may incur the wrath of both the applegrower and the beekeeper. However, Cheung says that these issues do not pose serious problems because of the repeated interactions with neighbors.

Cheung doesn't mention the possibility of internalizing the beekeeping externality. I grew up on an apple orchard in Ohio and the common practice there was to keep your own hive of bees. I recall that we hired a professional beekeeper now and then to remove the honey, control swarming, and so on but my family actually owned the bees.

Here we have 3 kinds of property rights for bees and orchards: totally independent (as described by Meade), independent ownership with contractual relations (as described by Cheung), and internalization (as practiced on the Varian orchard). Meade's case is probably seldom practiced since it would, as he argued, certainly be inefficient. Although he suggests that some kind of "subsidies and taxes" must be imposed, it is clear that the more common solution is private contracts or internalization. Meade is right that

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<sup>4</sup> For a more current popular exposition of the economics of bee-keeping, see Mairson (1993).

independent operation is inefficient: he was wrong to leap immediate to a tax/subsidy solution. The private market seems to do a pretty good job in providing bee services.

*Poole: contracting for the production of public goods*

Robert Poole, Jr. claims that "most people think of fire protection as a typical public good." I don't know if most people think that or not, but certainly most economists shouldn't think of fire protection as a public good. Is it excludable? Yes. Is fire protection congestible? Yes, but only to a slight degree. The "public" aspect of fire prevention is rather different than that suggested by Poole. The problem is that inadequate fire prevention at my neighbor's house, for example, can increase the risk of fire to my own house. If my neighbor doesn't subscribe to a fire protection "club" it can be costly to me.

Poole's claim that "fee for use" and "private provision of 'public' services" are likely to be more efficient than government provision is likely true, but beside the point. Even if a local governmental unit decides to use say, private garbage pickup, it still typically requires all residents to contract with a garbage pickup service. Presumably this is due to the negative externalities of letting garbage pile up in one's backyard and the economies of scale of using a single garbage service.

Poole is right that it is often more efficient for governments to contract with private firms to provide services, and they have often done so. States have provided public defense by hiring mercenaries, and have even auctioned off the right to collect taxes to private individuals. But this seems to me to be a side issue to the fundamental questions about public goods. The public goods question is concerned with *what* and *how much* the state should provide of various services; Poole's essays are concerned with *how* these services should be provided. Samuelson would find little to take issue with in Poole's essays.

#### 10. The failure of market failure?

The common theme of these essays is that they challenge the "market failure conclusion that many economists and policymakers have drawn from Samuelson's theory." (p. 1) This is a fair statement, but it is important to point out that a *correct* understanding of

the theory public goods does not lead to the claim that they must be publicly supplied. Certainly Samuelson made this point quite clearly.

Nevertheless, it is fair to say that this point has not been sufficiently widely appreciated, and this collection of essays is an important antidote to claims of market failure. Nevertheless the message that I take away from this collection is not that the state should *refrain* from intervention in problems involving public goods, but rather that the state should be more open to a richer set of interventions that facilitate private solutions to public goods problems.

The solutions to public goods offered by the essays in this volume take a variety of forms: tying arrangements, private contracts, repeated interactions, exclusion, subcontracting and so on. But as we have seen these solutions usually require some form of public intervention. For example tying arrangements can only succeed when competition can be prevented, exclusionary provisions and contracts must be sanctioned by the state, and so on. It is not government intervention itself that is the problem, but rather the form of the intervention. Tyler Cowan has done us a great service by pulling together a set of essays that remind us of this fact.

## References

- Bagnoli, M., and Lipman, B. (1989). Provision of public goods: fully implementing the core through private contributions. *Review of Economic Studies*, 56, 583--602.
- Bergstrom, T., Blume, L., and Varian, H. (1986). On the private provision of public goods. *Journal of Public Economics*, 29, 25--49.
- Bergstrom, T. (1993). A survey of theories of the family. Tech. rep., University of Michigan.
- Bewley, T. (1981). A critique of Tiebout's theory of local public expenditure. *Econometrica*, 49, 713--740.
- Blumel, W., Pethig, R., and von dem Hagen, O. (1986). The theory of public goods: a survey of recent issues. *Journal of Institutional and Theoretical Economics*, 142, 241--310.
- Cornes, R., and Sandler, T. (1986). *The Theory of Externalities, Public Goods, and Club Goods*. Cambridge University Press, Cambridge, England.
- Ledyard, J. (1992). Public goods: A survey of experimental research. Tech. rep., California Institute of Technology. Forthcoming in the Handbook of Experimental Economics.
- Mairson, A. (1993). America's beekeepers: Hives for hire. *National Geographic*, 183(5), 73--93.
- Meade, J. E. (1952). External economies and diseconomies in a competitive situation. *Economic Journal*, 54, 56--65.
- Samuelson, P. A. (1972). Indeterminacy of government role in public-good theory. In Merton, R. C. (Ed.), *The Collected Scientific Papers of Paul A. Samuelson*, Vol. III. MIT Press, Cambridge, MA.
- Varian, H. R. (1993). *Intermediate Microeconomics* (Third edition). W. W. Norton and Company, New York.